

Full Length Research Paper

Effect of bulb removal date on growth and flowering of Asiatic hybrid lily cv. "Brunello"

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The objective of the present study was to investigate the effect of different bulb removal dates during plant growth on growth and flowering of Asiatic hybrid lily cv. "Brunello". The study was carried out in the nursery of Floriculture Unit, Baghdad University, Iraq, from January to April 2012. During plant growth, the bulbs were not removed (control) or removed four, six, eight and ten weeks after planting. The results revealed that buds number, flowers number, flower diameter and plant height were reduced while number of aborted buds increased when the bulbs were removed during active growth. The degree of bulb removal effect was dependent on date of bulb removal. The effect was severe when the bulbs were removed 8 weeks after planting at which time the plants were at the flower bud development; the plants were shorter and more sensitive to buds abortion and produced less flowers with smaller size compared to other treatments. It is necessary to perform further studies to clarify the relation between the bulb and plant development and to investigate the plant physiological and biochemical changes upon bulb removal during plant growth.

Key words: Asiatic hybrid lily, growth, flowering, bulb removal.

INTRODUCTION

In "Liliaceae" family, there are nearly 250 genera, and 3500 species including the genus *Lilium*. Recently, the subject of bulb and cut flower production in the genus *Lilium* had received considerable attention (Roh, 2011; Grassotti and Gimelli, 2011). Asiatic lily hybrids are flowering, herbaceous, perennial, monocot plants with concentric, non-tunicate bulbs that have stem roots and basal, contractile roots. The stem roots, produced between the bulb and soil surface, are feeding roots and are very important to growth (Turner et al., 1990). The bulb is a sink organ where starch is the dominant reserve energy source for plant growth. Starch is degraded into sucrose which can be transported and utilized for the initial growth (Miller, 1992). Several studies were reported regarding lily bulbs. Zheng et al. (2012) tested the hypothesis that the plant growth retardants chlorocholine chloride and paclobutrazol could improve carbohydrate accumulation in lily bulbs by enhancing photosynthetic capacity and changing endogenous hormones. Kim et al. (2003) studied the effect of bulb scale removal before planting on growth and flowering of lily. Treder (2003) also studied the effect

of supplemental lighting on partitioning of carbohydrates in bulbs of oriental lily.

Little attention has been drawn to the physiological role of the main bulb and the vital role of its reserved carbohydrate on growth and development. (Addai et al., 2011a, b; Miller 1992). It is necessary to carry out studies to understand the relationship between the main bulb and plant development and to study the capability of the stem roots and photosynthetic leaves to achieve a successful completion of development when the bulbs are removed, therefore the aim of the present study was to investigate the effect of different dates of bulb removal during active growth on growth and flowering of Asiatic hybrid lily cv. "Brunello".

MATERIALS AND METHODS

This experiment was conducted in the nursery of Floriculture Unit, Baghdad University, Iraq in January to April of 2012. Asiatic hybrid lily cv. "Brunello" bulbs (12 to 14 cm in circumference) were imported from the Netherlands. The bulbs were potted individually into 19 cm plastic pots containing peat-moss (peat-moss were

Table 1. The influence of bulb removal date on number of buds per plant 6 and 8 weeks after planting.

Time of bulb removal (weeks)	Number of buds per plant after planting	
	6	8
Weeks after planting		
Bulbs not removed (control)	1.75	4.67
4	0.71	3.58
6	2.13	4.33
8	1.75	4.38
10	1.5	3.79
LSD at ($p < 0.05$)	1.04	0.82

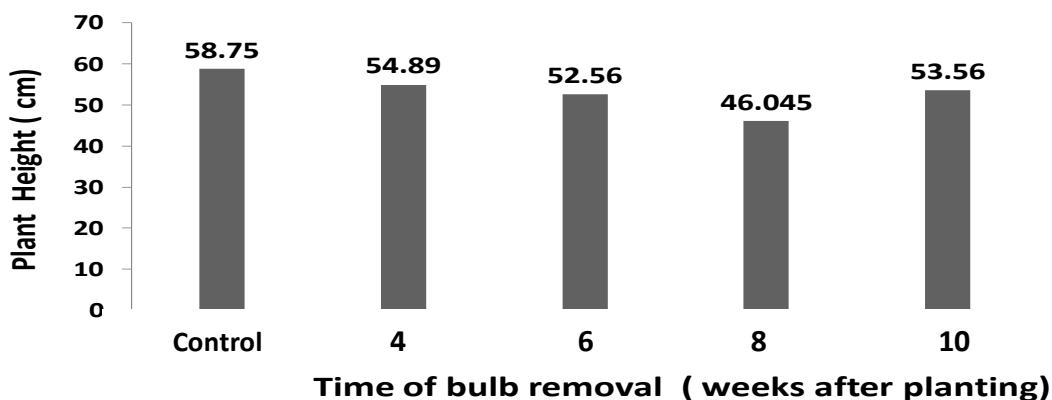


Figure 1. Effect of bulb removal date on plant height (cm). LSD at ($p < 0.05$) 4.46.

obtained from Estonia, type H2-4, and contains N.P.K. -14.16-18 fertilizer, lime, pH value: 5.9). While potting, nose of the bulb was placed about 7 cm below the soil surface to promote development of stem roots. Then all pots were placed in a plastic house and irrigated manually as needed.

To remove the bulb from the plant, the stem was cut carefully above the nose of the bulb four, six, eight and ten weeks after planting and the average of stem lengths (cm) were 15.65, 32.00, 39.83, and 46.43 cm those dates respectively, the plants re-potted again immediately after bulb removing. The control treatment consisted of plants whose bulbs were not removed. Data were collected on plant height (cm), number of aborted buds per plant, number of flowers per plant and flower diameter (cm) after 12 weeks from planting (at flowering time), and number of buds per plant after 6, 8 weeks of planting. This experiment was arranged in a completely randomized block design (CR-BD) with five treatments, each treatment with three replicates, each replicate had 8 pots (total: 120 pots). Data were subjected to analysis of variance using (SAS) program and the mean separation was performed using Duncan's multiple range test at the 5% level of significance.

RESULTS

Buds number

After 6 weeks of planting the visible buds appeared in all plants, after 8 weeks from planting, the plants in control treatment had more buds while the plants of four weeks treatment had less buds compared to the plants of other

treatments (Table 1).

Plant height

The results in Figure 1 showed that the plants at flowering time in control treatment were taller significantly compared to six, eight and ten weeks treatments while the shorter plants were observed in eight weeks treatment compared to the plants of other treatments.

Aborted buds number

The number of aborted buds per plant was higher significantly in six and eight weeks treatments compared to other treatments, and the maximum number of aborted buds was recorded in eight weeks treatment. While the plants of control, four and ten weeks treatments had no problem of bud abortion (Figure 2).

Flowers number

All treatments had the same flowering time (after 12 weeks of planting) and the control plants had significantly more flowers while eight weeks plants had less flowers

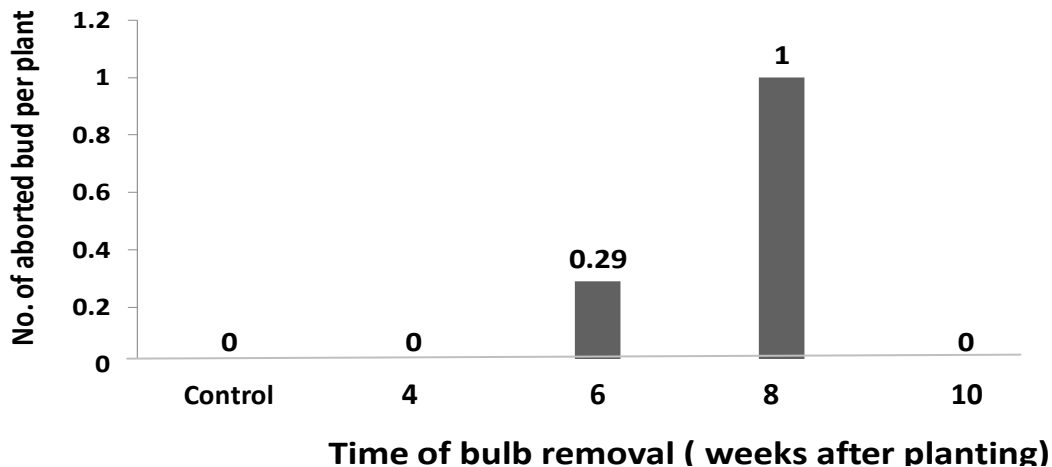


Figure 2. Effect of bulb removal date on number of aborted buds per plant. LSD at ($p < 0.05$) 0.21.

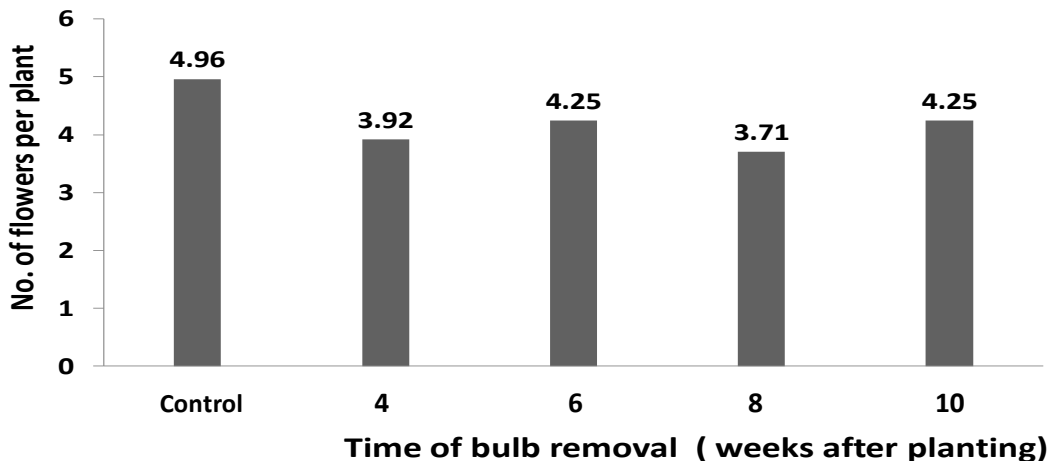


Figure 3. Effect of bulb removal date on number of flowers per plant LSD at ($p < 0.05$) 0.7.

(Figure 3).

Flower diameter

The plants of eight weeks treatment produced significantly smaller flower compared to the plants of other treatments except six weeks treatment (Figure 4).

DISCUSSION

This results showed that buds number, flowers number, flower diameter and plant height were reduced and aborted buds number was increased when the bulb was removed during active growth, but the degree of bulb removal effect varied depending on the growth stage at which the bulbs were removed. It is well known that the

plants at different growth stages are different in their ability of photosynthesis, capacity of nutrient uptake from soil by feeding roots, endogenous hormonal characteristics and changes in the reserved carbohydrates of the bulb scales (Miller, 1992, 1993; Qian and Yi, 2006; Zheng et al., 2012; Addai et al., 2011a, b; Xia et al., 2005).

The results also indicated that the eight weeks treatment plants, which were at the flower bud development stage when the bulbs were removed, were shorter and more sensitive to buds abortion and produced less flowers with smaller size compare to other treatments and that might be due to the carbohydrate production by photosynthesis and capacity of nutrient uptake by stem roots were insufficient for successful flowering process in plants at this treatment because the flowers have very rapid growth rates that require a large amounts of carbohydrates (Miller, 1992; Hwang et al.,

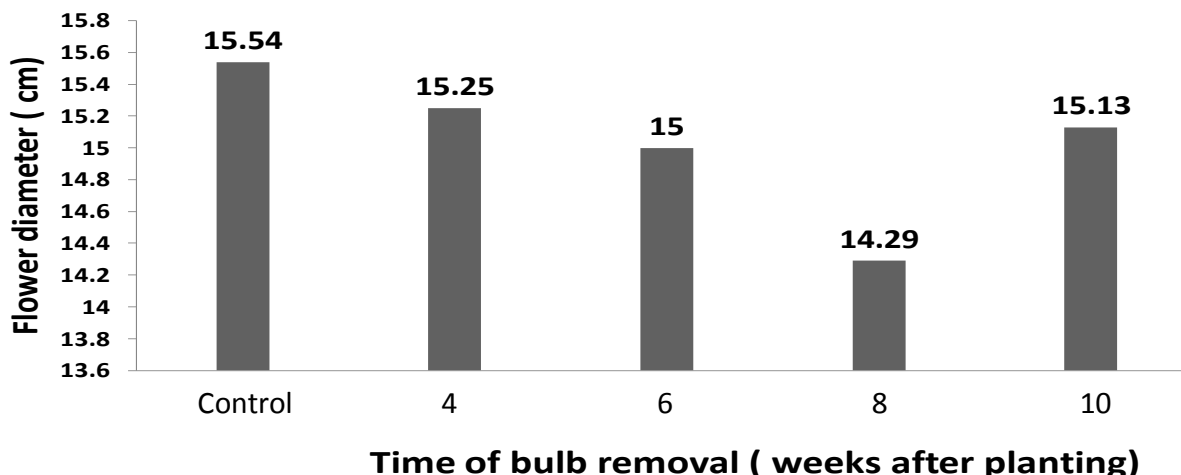


Figure 4. Effect of bulb removal date on flowers diameter (cm). LSD at ($p < 0.05$) 0.8.

2011).

These results concluded that the effect of bulb removal on growth and flowering of Asiatic hybrid lily plants were varied depending on the growth stage at which the bulbs were removed.

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